

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows.

1. (Original) A numerical control oscillator comprising:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of a sampling frequency F_s ,
wherein:

if an upper limit of a desired frequency setting interval of an output signal is FD and, K and L are arbitrary integers,

said calculator of said phase accumulator is performs one of adding and subtracting said input phase difference data and said phase data from said register by a modulo operation taking a nearest integer of M as a modulus, where $M = F_s/FD \times K/L$; and

said phase/amplitude conversion table outputs a signal set to a frequency setting interval of a dF step, where $dF = FD/K \times L$.

2. (Original) A digital down-converter comprising a frequency converter, the frequency converter including a numerical control oscillator as a local oscillator and serving to frequency-convert an input signal sampled at a sampling frequency F_s , said digital down-converter converting and outputting said input signal into an output signal with a frequency lower than that of said input signal, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency F_s , wherein, if a desired frequency setting interval of said input signal is F_D and K and L are arbitrary integers, said frequency converter is adapted to frequency-convert said input signal using a specific signal output from said local oscillator and set to a frequency setting interval of a dF step, where $dF = F_D/K \times L$, said local oscillator outputting the specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M as a modulus, where $M = F_s/F_D \times K/L$.

3. (Original) A digital down-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal sampled at a sampling frequency F_{s1} , and a second frequency converter, the second frequency converter including an identical numerical control oscillator as included in the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital down-converter converting and outputting said input signal into an output signal with a frequency lower than that of said input signal by two frequency conversions, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said input signal is F_D and K_1 , K_2 and L_1 are arbitrary integers,

said first frequency converter is adapted to frequency-convert said input signal

using a first specific signal output from said first local oscillator and set to a frequency setting interval of an FD1 step, where $FD1 = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = Fs1/FD \times K1/L1$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is $Fs2$, frequency-convert said output signal from said first frequency converter using a second specific signal output from said second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = (FD \bmod FD1)/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = Fs2/(FD \bmod FD1) \times K2$.

4. (Original) The digital down-converter as set forth in claim 3, wherein said second frequency converter is adapted to stop the frequency conversion.

5. (Original) A digital down-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal sampled at a sampling frequency $Fs1$, and a second frequency converter, the second frequency converter including an identical

numerical control oscillator as the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital down-converter converting and outputting said input signal into an output signal with a frequency lower than that of said input signal by two frequency conversions, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said input signal is FD , and $K1$, $K2$ and $L1$ are arbitrary integers,

said first frequency converter is adapted to frequency-convert said input signal using a first specific signal output from said first local oscillator and set to a frequency setting interval of an $FD1$ step, where $FD1 = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 =$

$F_{s1}/FD \times K1/L1$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is F_{s2} , frequency-convert said output signal from said first frequency converter using a second specific signal output from said second local oscillator and set to a frequency setting interval of an $FD2$ step, where $FD2 = (FD1 \bmod FD)/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M2$ as a modulus, where $M2 = F_{s2}/(FD1 \bmod FD) \times K2$.

6. (Original) The digital down-converter as set forth in claim 5, wherein said second frequency converter is adapted to stop the frequency conversion.

7. (Original) A digital down-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal sampled at a sampling frequency F_{s1} , and a second frequency converter, the second frequency converter including an identical numerical control oscillator as in the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital down-converter converting and outputting said input signal into an output signal with a frequency lower than that of said input signal by two frequency

conversions, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said input signal is FD and $K1$, $K2$ and $L1$ are arbitrary integers,

said first frequency converter is adapted to frequency-convert said input signal using a first specific signal output from said first local oscillator and set to a frequency setting interval of an $FD1$ step, where $FD1 = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 = Fs1/FD \times K1/L1$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is $Fs2$, frequency-convert said output signal from said first frequency converter using a second specific signal output from said

second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = FD/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = Fs2/FD \times K2$.

8. (Original) The digital down-converter as set forth in claim 7, wherein said second frequency converter is adapted to stop the frequency conversion.

9. (Original) A digital up-converter comprising a frequency converter, the frequency converter including a numerical control oscillator as a local oscillator and serving to frequency-convert an input signal, said digital up-converter converting said input signal into a signal with a frequency higher than that of said input signal and outputting the converted signal as an output signal sampled at a sampling frequency F_s , said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency F_s , wherein, if a desired frequency setting interval of said output signal is F_D and K and L are arbitrary integers, said frequency converter is adapted to frequency-convert said input signal using a specific signal output from said local oscillator and set to a frequency setting interval of a dF step, where $dF = F_D/K \times L$, said local oscillator outputting the specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M as a modulus, where $M = F_s/F_D \times K/L$.

10. (Original) A digital up-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal, and a second frequency converter, the second frequency converter including an identical numerical control oscillator as included in the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital up-converter performing two frequency conversions to convert said input signal into a signal with a frequency higher than that of said input signal and output the converted signal as an output signal sampled at a sampling frequency F_{s2} , said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said

phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency,

wherein:

if a desired frequency setting interval of said output signal is FD , and $K1$, $K2$, and $L2$ are arbitrary integers,

said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an $FD2$ step, where $FD2 = FD/K2 \times L2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M2$ as a modulus, where $M2 = Fs2/FD \times K2/L2$; and

said first frequency converter is adapted to, if a sampling frequency of said input signal is $Fs1$, frequency-convert said input signal using a second specific signal output from said first local oscillator and set to a frequency setting interval of an $FD1$ step, where $FD1 = (FD \bmod FD2)/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 = Fs1/(FD \bmod FD2) \times K1$.

11. (Original) The digital up-converter as set forth in claim 10, wherein said first frequency converter is adapted to stop the frequency conversion.

12. (Original) A digital up-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal, and a second frequency converter, the second frequency converter including an identical numerical control oscillator as included in the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital up-converter performing two frequency conversions to convert said input signal into a signal with a frequency higher than that of said input signal and output the converted signal as an output signal sampled at a sampling frequency F_{s2} , said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency,
wherein:
if a desired frequency setting interval of said output signal is FD and K1, K2 and L2 are arbitrary integers,
said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = FD/K2 \times L2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = Fs2/FD \times K2/L2$; and
said first frequency converter is adapted to, if a sampling frequency of said input signal is Fs1, frequency-convert said input signal using a second specific signal output from said first local oscillator and set to a frequency setting interval of an FD1 step, where $FD1 = (FD2 \bmod FD)/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = Fs1/(FD2 \bmod FD) \times K1$.

13. (Original) The digital up-converter as set forth in claim 12, wherein said first frequency converter is adapted to stop the frequency conversion.

14. (Original) A digital up-converter comprising a first frequency converter, the first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-convert an input signal, and a second frequency converter, the second frequency converter including an identical numerical control oscillator as included in the first frequency converter as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said digital up-converter performing two frequency conversions to convert said input signal into a signal with a frequency higher than that of said input signal and output the converted signal as an output signal sampled at a sampling frequency F_{s2} , said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said output signal is F_D and K_1 , K_2 and L_2 are arbitrary integers,

said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an $FD2$ step, where $FD2 = FD/K2 \times L2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M2$ as a modulus, where $M2 = Fs2/FD \times K2/L2$; and

said first frequency converter is adapted to, if a sampling frequency of said input signal is $Fs1$, frequency-convert said input signal using a second specific signal output from said first local oscillator and set to a frequency setting interval of an $FD1$ step, where $FD1 = FD/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 = Fs1/FD \times K1$.

15. (Original) The digital up-converter as set forth in claim 14, wherein said first frequency converter is adapted to stop the frequency conversion.

16. (Currently Amended) A receiver comprising a first frequency converter, the first frequency converter including a first local oscillator and serving to frequency-convert a received signal, said first local oscillator including a numerical control oscillator operating at a sampling frequency Fs and a phase locked loop (PLL) circuit having a

multiplication ratio P, wherein P is an integer, P (P is an integer) and acting to receive the output signal from the numerical control oscillator as a reference signal, a second frequency converter, the second frequency converter including an identical numerical control oscillator as included in the first local oscillator as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, and a demodulator for demodulating an output signal from said second frequency converter to extract received data therefrom, said receiver converting said received signal into a baseband received signal with a frequency lower than that of said received signal by two frequency conversions and extracting the received data from the converted baseband received signal, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said received signal is FD and $K1$, $K2$ and $L1$ are arbitrary integers,

said first frequency converter is adapted to frequency-convert said received signal using a first specific signal output from said first local oscillator and set to a frequency setting interval of an FDP step, where $FDP = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = F_s/FD \times K1/L1 \times P$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is F_{s1} , frequency-convert said output signal from said first frequency converter using a second specific signal output from said second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = (FD \bmod FDP)/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = F_{s1}/(FD \bmod FDP) \times K2$.

17. (Original) The receiver as set forth in claim 16, wherein said second frequency converter is adapted to stop the frequency conversion.

18. (Currently Amended) A receiver comprising a first frequency converter including a first local oscillator and serving to frequency-convert a received signal, said first local oscillator including a numerical control oscillator operating at a sampling

frequency F_s and a PLL circuit having a multiplication ratio P , wherein P is an integer, P (~~P is an integer~~) and acting to receive the output signal from the numerical control oscillator as a reference signal, a second frequency converter including an identical numerical control oscillator as included in the first local oscillator as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, and a demodulator for demodulating an output signal from said second frequency converter to extract received data therefrom, said receiver converting said received signal into a baseband received signal with a frequency lower than that of said received signal by two frequency conversions and extracting the received data from the converted baseband received signal, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said received signal is F_D , and K_1 , K_2 , and L_1 are arbitrary integers,

said first frequency converter is adapted to frequency-convert said received signal using a first specific signal output from said first local oscillator and set to a frequency setting interval of an FDP step, where $FDP = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = F_s/FD \times K1/L1 \times P$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is F_{s1} , frequency-convert said output signal from said first frequency converter using a second specific signal output from said second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = (FDP \bmod FD)/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = F_{s1}/(FDP \bmod FD) \times K2$.

19. (Original) The receiver as set forth in claim 18, wherein said second frequency converter is adapted to stop the frequency conversion.

20. (Currently Amended) A receiver comprising a first frequency converter including a first local oscillator and serving to frequency-convert a received signal, said first local oscillator including a numerical control oscillator operating at a sampling

frequency F_s and a PLL circuit having a multiplication ratio P , wherein P is an integer, ~~P~~
(~~P is an integer~~) and acting to receive the output signal from the numerical control oscillator as a reference signal, a second frequency converter including an identical numerical control oscillator as included in the first local oscillator as a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, and a demodulator for demodulating an output signal from said second frequency converter to extract received data therefrom, said receiver converting said received signal into a baseband received signal with a frequency lower than that of said received signal by two frequency conversions and extracting the received data from the converted baseband received signal, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said received signal is F_D , and K_1 , K_2 , and L_1 are arbitrary integers,

said first frequency converter is adapted to frequency-convert said received signal using a first specific signal output from said first local oscillator and set to a frequency setting interval of an FDP step, where $FDP = FD/K1 \times L1$, said first local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = Fs/FD \times K1/L1 \times P$; and

said second frequency converter is adapted to, if a sampling frequency of the output signal from said first frequency converter is $Fs1$, frequency-convert said output signal from said first frequency converter using a second specific signal output from said second local oscillator and set to a frequency setting interval of an FD2 step, where $FD2 = FD/K2$, said second local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = Fs1/FD \times K2$.

21. (Original) The receiver as set forth in claim 20, wherein said second frequency converter is adapted to stop the frequency conversion.

22. (Currently Amended) A transmitter comprising a modulator for modulating and outputting a baseband transmit signal based on transmit data, a first frequency converter including a numerical control oscillator as a first local oscillator and serving to

frequency-convert the output signal from said modulator, a second frequency converter including a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said second local oscillator including an identical numerical control oscillator as included in the first frequency converter operating at a sampling frequency F_s and a PLL circuit having a multiplication ratio P , wherein P is an integer, P (~~P is an integer~~) and acting to receive the output signal from the numerical control oscillator as a reference signal, said transmitter converting and outputting said baseband transmit signal into a transmit signal with a frequency higher than that of said baseband transmit signal by two frequency conversions, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency, wherein:

if a desired frequency setting interval of said transmit signal is F_D , and K_1 , K_2 , and L_2 are arbitrary integers,

said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an FDP step, where $FDP = FD/K2 \times L2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M2$ as a modulus, where $M2 = Fs/FD \times K2/L2 \times P$; and

said first frequency converter is adapted to, if a sampling frequency of the output signal from said modulator is $Fs1$, frequency-convert said output signal from said modulator using a second specific signal output from said first local oscillator and set to a frequency setting interval of an FD1 step, where $FD1 = (FD \bmod FDP)/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 = Fs1/(FD \bmod FDP) \times K1$.

23. (Original) The transmitter as set forth in claim 22, wherein said first frequency converter is adapted to stop the frequency conversion.

24. (Currently Amended) A transmitter comprising a modulator for modulating and outputting a baseband transmit signal based on transmit data, a first frequency converter including a numerical control oscillator as a first local oscillator and serving to

frequency-convert the output signal from said modulator, a second frequency converter including a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said second local oscillator including an identical numerical control oscillator as included in the first frequency converter operating at a sampling frequency F_s and a PLL circuit having a multiplication ratio P , wherein P is an integer, P (~~P is an integer~~) and acting to receive the output signal from the numerical control oscillator as a reference signal, said transmitter converting and outputting said baseband transmit signal into a transmit signal with a frequency higher than that of said baseband transmit signal by two frequency conversions, said numerical control oscillator having:

a phase accumulator for accumulating input phase difference data to generate phase data, said phase accumulator including a register for storing and outputting said phase data, and a calculator for one of adding and subtracting said input phase difference data and said phase data from said register; and

a memory for storing a phase/amplitude conversion table to output amplitude data corresponding to said phase data generated by said phase accumulator,

said numerical control oscillator outputting a signal of the sampling frequency,
wherein:

if a desired frequency setting interval of said transmit signal is F_D , and K_1 , K_2 , and L_2 are arbitrary integers,

said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an FDP step, where $FDP = FD/K2 \times L2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M2 as a modulus, where $M2 = Fs/FD \times K2/L2 \times P$; and

said first frequency converter is adapted to, if a sampling frequency of the output signal from said modulator is $Fs1$, frequency-convert said output signal from said modulator using a second specific signal output from said first local oscillator and set to a frequency setting interval of an FD1 step, where $FD1 = (FDP \bmod FD)/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M1 as a modulus, where $M1 = Fs1/(FDP \bmod FD) \times K1$.

25. (Original) The transmitter as set forth in claim 24, wherein said first frequency converter is adapted to stop the frequency conversion.

26. (Original) A transmitter comprising a modulator for modulating and outputting a baseband transmit signal based on transmit data, a first frequency converter including a numerical control oscillator as a first local oscillator and serving to frequency-

convert the output signal from said modulator, a second frequency converter including a second local oscillator and serving to secondarily frequency-convert an output signal from said first frequency converter, said second local oscillator including an identical numerical control oscillator as included in the first frequency converter operating at a sampling frequency F_s and a PLL circuit having a multiplication ratio P , where P is an integer, and acting to receive the output signal from the numerical control oscillator of claim 1 as a reference signal, said transmitter converting and outputting said baseband transmit signal into a transmit signal with a frequency higher than that of said baseband transmit signal by two frequency conversions, wherein:

if a desired frequency setting interval of said transmit signal is F_D , and K_1 , K_2 , and L_2 are arbitrary integers,

said second frequency converter is adapted to frequency-convert the output signal from said first frequency converter using a first specific signal output from said second local oscillator and set to a frequency setting interval of an FDP step, where $FDP = F_D/K_2 \times L_2$, said second local oscillator outputting the first specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of M_2 as a modulus, where $M_2 = F_s/F_D \times K_2/L_2 \times P$; and

said first frequency converter is adapted to, if a sampling frequency of the output signal from said modulator is F_{s1} , frequency-convert said output signal from said modulator using a second specific signal output from said first local oscillator and set to a

frequency setting interval of an $FD1$ step, where $FD1 = FD/K1$, said first local oscillator outputting the second specific signal by accumulating said phase difference data by a modulo operation taking a nearest integer of $M1$ as a modulus, where $M1 = Fs1/FD \times K1$.

27. (Original) The transmitter as set forth in claim 26, wherein said first frequency converter is adapted to stop the frequency conversion.